

ABSTRACT OF THE DISCLOSURE

In place of a magnetic field in which it is difficult to write onto and read a hard disk at high density, there is provided an information storage apparatus capable of writing and reading by means of a metal probe which applies a voltage to a thin film structure in a non contact manner to change the relative magnetization direction in the thin film layers to store information. Changes in a tunnel current between the thin film layers is then used to detect the relative magnetization direction and to read the stored information. At least a three-layer thin film structure including a magnetic metallic layer, a non-magnetic metallic layer and a magnetic metallic layer may be formed. A metal probe is brought close to the surface of this multilayer film at distance on the order of one nanometer. The distance between the metal probe and the surface of the multilayer film and applied voltage are changed, whereby a quantum well state which occurs in the multilayer film is changed to change relative magnetization between magnetic metallic layers. In order to read magnetization information, there will be utilized a change in tunnel current which flows between the metal probe and the multilayer film which results from a change in a quantum well level due to a change in the relative direction of magnetization between magnetic metallic layers.